

WHAT IS CLAIMED IS

1. A sheet metal rocker arm manufactured by the steps of punching a sheet of metal plate to form a blank having a predetermined contour and a through hole, and then 5 subjecting this blank to a bending work based on a press work to form a pair of side walls parallel to each other, a connecting portion for connecting the ends of the both side walls in the width direction, at least a pair of though holes formed at positions which are aligned with each 10 other on the both side walls; and at least one engagement portion provided in a part of said connecting portion,

characterized in that the thickness of the part with at least one engagement portion provided thereon, out of said connecting portion, is greater than the thickness 15 of said both side walls by subjecting to a press work the part with at least said one engagement portion provided thereon, out of this connecting portion.

2. A sheet metal rocker arm according to claim 1, 20 wherein the thickness of the part with at least one engagement portion provided thereon, out of said connecting portion, is formed greater than the thickness of the side walls by 5% to 40%.

25 3. A sheet metal rocker arm according to claim 1, the metal plate is formed of low carbon case hardening steel, a carburizing layer having the depth of 0.3 mm to

0.8 mm is formed on the surface portion to be in contact with another member at least when it is in use, and the surface hardness of said portion is not less than Hv 653.

5 4. A sheet metal rocker arm according to claim 1, wherein the pair of through holes are formed in middle parts of the side walls in the length direction, the engagement portion is comprised of a first and second engagement portions, the first engagement portion, out 10 of these engagement portions, for abutting the base end portion of a valve unit is formed at one end of each of the side walls in the length direction out of the connecting portion, while the second engagement portion for abutting on the leading end of a rush adjuster is formed 15 at the opposite end of each of the side walls in the length direction out of the connecting portion, respectively, the both ends of a support shaft for supporting rotatably a roller engaged with a cam can be supported at the paired through holes, and the thickness of at least the portion 20 forming said first engagement portion out of said connecting portion is made greater than the thickness of the side walls.

25 5. A sheet metal rocker arm according to claim 1, wherein the through holes comprise a pair of first through holes and a pair of second through holes, said first through holes are formed in middle parts of the side walls

in the length direction, while the second through holes
are formed at the end portions of the side walls in the
length direction, respectively, a pivot for supporting
rockably the sheet metal rocker arm at its fixed portion
5 can be inserted into said first through holes, while the
both end portions of the support shaft for supporting
rotatably the roller engaged with the cam can be supported
at said second through holes, the engagement portion for
abutting the base end portion of the valve unit is formed
10 at the ends of the side walls in the length direction out
of the connecting portion, and the thickness of the
portion to become this engagement portion out of said
connecting portion is made greater than the thickness of
the side walls.

15 6. A method of manufacturing a sheet metal rocker
arm according to claim 1, comprising the steps of:

20 forming the both side walls by subjecting a blank
to a bending work, and at the same time, forming a curved
portion by bending a portion corresponding to the
connecting portion to have a arched section;

conducting, thereafter, a pressing work for
strongly pressing this curved portion to be plastically
deformed; and

25 increasing the thickness of this curved portion to
form an engagement portion in this curved portion.

7. A manufacturing method according to claim 6,
wherein at least a pair of straight line edges which are
parallel to each other are formed in parts of the blank
corresponding to the end edge portions in the width
5 direction of the curved portion, and the leading end of
a pressing punch is caused to abut on these straight line
edges when the pressing work is conducted.

8. A sheet metal rocker arm provided, by subjecting
10 one metal plate to a punching work and a bending work,
with a pair of side walls which are substantially parallel
to each other, a connecting portion for connecting the
ends of these side walls in the width direction to each
other, a pair of through holes formed at positioned
15 aligned with each other on the side walls, a first
engagement portion provided in a part of said connecting
portion for abutting the base end portion of a valve unit,
and a second engagement portion formed in another part
of this connecting portion for abutting the leading end
20 of a rush adjuster,

characterized in that the thickness of said first
engagement portion is made greater than the thickness of
said side walls, and the forms and the sizes of the
respective members are restricted such that a ratio of
25 the maxim value to the minimum value of a stress generated
in the first and second engagement portions based on a
load applied from the valve unit and the rush adjuster

to the first and second engagement portions is 5 or less.

9. A cam follower provided with a sheet metal rocker arm comprising:

5 a sheet metal rocker arm formed of a metal plate and provided with a pair of side walls to be substantially parallel to each other, and a connecting portion for connecting these side walls to each other;

10 a pivot fixed to bridge over said paired side walls by caulking, in a state of bridging over a pair of through holes formed at positioned aligned with each other on these side walls, the both end portions thereof toward the inner peripheral surfaces of these through holes; and

15 a roller supported rotatably around a middle part of this pivot,

characterized in that, in a state prior to a caulking of the both end portions of said pivot, a gap between the portions provided with said through holes on the paired side walls in a state prior to the caulking of the both end portions of said pivot is made wider than the gap between said portions in a state that the both end portions of said pivot are caulked, so as to make said paired side walls to be parallel to each other in a state that the both end portions of this pivot are caulked.

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10. A method of assembling a cam follower provided with a sheet metal rocker arm, which is formed of a metal

plate and comprises a pair of side walls and a connecting portion for connecting these side walls to each other and in which a pair of through holes are formed at positions aligned to each other on the both side walls, comprising
5 the steps of:

inserting a pivot into a roller and said paired side walls in a state that this roller is disposed between said paired side walls, thereafter caulking the both end portions of this pivot toward the inner peripheral surfaces of the paired through holes, whereby this pivot
10 is fixed to bridge over the paired side walls,

characterized in that a gap between the portions with the paired through holes formed thereon, out of said paired side walls, in a state prior to caulking the both end portions of said pivot, is made wider than the gap of these portions in a state that the both end portions of said pivot are caulked, and the gap between the portions with said through holes formed thereon, out of said paired side walls, is made narrow upon caulking the both end portions of this pivot, thereby making the paired side walls parallel to each other.
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11. A cam follower comprising:
a sheet metal rocker arm made of a metal plate and
25 provided with a pair of side walls substantially parallel to each other, and a connecting portion for connecting these side walls to each other;

a pivot fixed to bridge over the paired side walls, supported at the both ends thereof by a pair of through holes formed at positions aligned with each other on these side walls; and

5 a roller supported rotatably around a middle part of this pivot,

characterized in that on the inner side surface of at least one of said paired side walls, there is formed a recess for receiving a lubricating oil with one end open 10 at the outer edge of said side wall and the other end inclined in a direction in which the recess becomes shallower toward the opposite end.

12. A cam follower comprising:

15 a sheet metal rocker arm made of a metal plate and provided with a pair of side walls substantially parallel to each other, and a connecting portion for connecting these side walls to each other;

20 a pivot fixed to bridge over the paired side walls, supported at the both ends thereof by a pair of through holes formed at positions aligned with each other on these side walls; and

a roller supported rotatably around a middle part of this pivot,

25 characterized in that the degree of flatness of the inner side surface of each of the side walls is 10 μm or less, and the surface roughness thereof is 0.3 μmRa or

less.

13. A cam follower comprising:

a sheet metal rocker arm made of a metal plate and
5 provided with a pair of side walls substantially parallel
to each other, and a connecting portion for connecting
these side walls to each other;

10 a pivot fixed to bridge over the paired side walls,
supported at the both ends thereof by a pair of through
holes formed at positions aligned with each other on these
side walls; and

15 a roller supported rotatably around a middle part
of this pivot,

characterized in that at least the inner side
surfaces of the side walls are subjected to a solid
lubricating film coating or a soft nitriding, thereby
decreasing a frictional coefficient of these inner side
surfaces.

20 14. A cam follower comprising:

a sheet metal rocker arm made of a metal plate and
provided with a pair of side walls substantially parallel
to each other, and a connecting portion for connecting
these side walls to each other;

25 a pivot fixed to bridge over the paired side walls,
supported at the both ends thereof by a pair of through
holes formed at positions aligned with each other on these

side walls; and

a roller supported rotatably around a middle part
of this pivot,

characterized in that washers are provided between
5 the inner side surfaces of the side walls and the both
end surfaces of said roller in the axial direction or the
both end surfaces of a needle for constituting a radial
needle bearing provided on the inner diameter side of this
roller rotatably around said pivot.